The Secretary of Energy
Washington, DC 20585

February 28, 1997

The Honorable Thomas J. Bliley, Jr.
Chairman, Committee on Commerce
U.S. House of Representatives
Washington D.C. 20515

Dear Mr. Chairman:

The enclosed report is submitted in response to a requirement in the National Defense Authorization Act for Fiscal Year 1997. Section 3154 of the Act directs the Department of Energy to conduct a study of its potential natural resource damage liability at its sites and submit a report on the study to the Senate Committees on Environment and Public Works, Armed Services, and Energy and NaturaI Resources, and the House Committees on Commerce, National Security, Transportation and Infrastructure, and Resources.

The Department's policy, as both the primary natural resource trustee and lead response agency for cleanup at its facilities, is to work with the Federal, State and Tribal trustees early m the cleanup process and address their concerns, to the extent possible, during remedy selection to limit or elminate the potential for significant natural resource damage liability. The Department has initiated other efforts that are intended to minimize the potential for natural resource damage claims, such as creating site-specific advisory boards at its facilities, ensuring participation of interested parties in the remedial action planning process, and forming natural resource trustee councils at facilities where there is sufficient interest.

The natural resource damage liability of the Department is difficult to predict at this time. In addition to a number of unresolved legal issues, factors that could influence natural resource damage liability include the degree to which the natural resources have been injured and the degree to which the concerns of the natural resource trustees can be satisfied in the remedy selection process. No formal natural resource damage assessments have been done at any Department sites. Furthermore, response action remedies have not yet been selected at many locations and, therefore, the residual effects that may remain after cleanup are not known.

In view of the foregoing the Department considers any estimate of its natural resource damage liability to be extremely speculative and not adequate for developing current budget estimates. At this time, the Department cannot predict, with any certainty, how many sites, or which sites, will experience claims and what its ultimate natural resource damage liability will be; nonetheless, the

Department has prepared a report that builds upon previous Administration and General Accounting Office estimates of potential natural resource damage Liabilities at Department of Energy facilities. The Department believes that the estimate range presented in this report $1.4 billion to $2.5 billion is a more reasonable estimate than that of the General Accounting Office, notwithstanding, the large range of uncertainty associated with any estimate. The Department intends incorporate its potential natural resource damage liability as a footnote in its consolidated financial statements. The Department's estimate, which is slightly higher than the Administration's earlier estimate because of the inclusion of response action expenditures from 1989 to 1995, is subject to change as better data on natural resource damage settlements become available.

The Department will continue to monitor the natural resource damage potential at its sites and will monitor private settlements. If it appears that the Department's natural resource damage liability will change significantly from current estimates, the Department will promptly inform the appropriate committees of Congress and will change the estimate included in the footnote to the Department's fixture consolidated financial statements.

Thank you for the opportunity to provide this information. If I may be of further assistance, please call me or have a member of your staff contact Mr. Robert Alcock, Acting Assistant Secretary for Congressional, Public, and Intergovernmental Affairs, at (202) 586-5506.

Sincerely,

Charles B. Curtis
Acting Secretary

Enclosure

cc: The Honorable John D. Dingell
Ranking Minority Member

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The Honorable Don Young
Chairman, Committee on Resources
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Washington, D.C. 20515

cc: The Honorable George Miller
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cc: The Honorable Carl Levin
Ranking Minority Member

The Honorable Craig Thomas
United States Senate
Washington, D.C. 20510

Report to the Congress of the United States

Estimate of Potential Natural Resource Damage Liabilities at U.S. Department of Energy Sites

February 1997

U.S. Department of Energy
Office of Environmental Management
Washington, D.C.

Executive Summary

Section 3154 of the National Defense Authorization Act for Fiscal Year 1997 directs the Department of Energy (DOE) to conduct a study of its potential natural resource damage liability at its sites using the Department of the Interior's (DOI) natural resource damage assessment regulations (43 CFR Part 11) promulgated pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). For reasons described in more detail below, any estimate of DOE's potential natural resource damage liability at this stage is necessarily uncertain and of limited value for current planning purposes; nonetheless, this report presents DOE's effort to build upon the Administration's and the General Accounting Office's (GAO) earlier, reasoned analyses of potential natural resource damage liability at DOE facilities. It must be emphasized, however, that any natural resource damages that DOE ultimately pays could be either considerably higher or lower than the estimates presented in this report because of the uncertainties associated with these estimates.

The Administration and GAO have both made estimates of natural resource damage liability at DOE sites based upon experience at private sector sites where natural resource damage claims have been settled. To date, there is no data base of actual DOE site-specific claims experience nor of potential injuries to natural resources at DOE sites after response actions are completed. At this time, the Department cannot predict with certainty how many sites, or which sites, will experience claims and what its ultimate natural resource damage liability will be. However, for the reasons discussed in this report, the Department believes that the estimate range presented in this report, $1.4 billion to $2.5 billion, is a more reasonable estimate of its potential natural resource damage liability than that of the GAO, given the very limited available information and recognizing a large range of uncertainty. The Department intends to reflect its potential natural resource damage liability in a footnote in its consolidated financial statements. The Department's estimate is subject to change as better data on natural resource damage settlements become available.

Convincing arguments can be marshaled that the potential natural resource damage liability could be large or small. The argument for a large estimate rests on the assumption that some recent large natural resource damage claims against private entities are indicative of the Department's potential liability, given the magnitude of the Department's contamination problems and associated response action needs. Because previous private-sector natural resource damage settlements have tended to be for smaller properties that were cleaned up earlier in the CERCLA program, subsequent settlements for more complex sites could be expected to be much higher. However, most large natural resource damage claims that have been asserted at private sites arise in situations where needed response work was not done and therefore must be addressed through the natural resource damage process. This should not be an issue at DOE sites due to the Department's policy and practice of integrating natural resource concerns into the environmental cleanup process. Others speculate that the Department's liability for natural resource damages would be small. They argue that most of the damages within the former weapons complex occur within Federal property, that close interaction with other natural resource trustees throughout the response action process should minimize natural resource damage claims. and that there is no tangible evidence that trustees will file large claims against DOE.

There are two ways to produce potentially more robust estimates of the Department's natural resource damage liability than those provided through the approach used to prepare the Administration's and GAO's estimates. First, DOE could attempt to determine the intentions of all the trustees of natural resources potentially injured by releases from DOE lands, including States and Tribes. Gathering this information would be premature, since trustees are participating in DOE's ongoing planning for response actions and have not reached the point where they could state any formal or final position on natural resource damage claims. Second, DOE could conduct detailed ecological surveys at each DOE facility and attempt to estimate potential natural resource damage liabilities in accordance with the DOI regulations. The time and cost required for such an effort would be large, the results would still be uncertain, and collection of these data in this form could invite claims that otherwise might not be asserted. In any case, such an estimate would be premature because remedy selection has not been completed at a majority of DOE sites. Furthermore, a premature estimate of this type unintentionally may generate unrealistic expectations concerning this liability that will not be supported by the facts or the law, particularly in light of DOE's efforts to minimize its potential natural resource damage liability.

DOE has concluded that the best way to reduce the potential for natural resource damage claims at its facilities is through the following:

- Incorporating resource values in land use planning;
- Working closely with trustees to identify concerns;
- Working closely with stakeholders, trustees, and regulators in incorporating resource values into remedy selection; and
- Mitigating resource injury in implementing response actions.

These four principles have been officially adopted by their inclusion in a recent interim policy statement from the Department's Assistant Secretary for Environmental Management. In short, DOE is strengthening its efforts to reduce natural resource damage liabilities to the maximum extent feasible.

DOE will continue to monitor the natural resource damage potential at its sites and will monitor private settlements. If it appears that the Department's natural resource damage liability will change significantly from current estimates, the Department will promptly inform the appropriate committees of Congress and will change the estimate of natural, resource damage liability included in the footnote to DOE's consolidated financial statements.

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Introduction

Under section 107 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), responsible parties are financially liable for injury to, destruction of, or loss of natural resources[1] caused by a release of a hazardous substance to the environment. Natural resource damage assessment regulations promulgated pursuant to CERCLA (43 CFR Part 11) provide natural resource trustees the ability to seek compensation on behalf of the public for resources that have been lost, destroyed, or injured. This may be accomplished by restoring injured natural resources to what would be expected had the release (or response action[2] taken to address the release) not occurred or by acquiring the equivalent of the lost or injured resource services.[3]

Federal agencies, such as the Department of the Interior (DOI), the National Oceanic and Atmospheric Administration (NOAA), and the Department of Energy (DOE), as well as States and Indian Tribes, are designated as natural resource trustees under CERCLA. Under CERCLA, natural resource trustees assess damages to natural resources and are required to use sums recovered for natural resource damages to "restore, replace, or acquire the equivalent of such natural resources." DOE also is responsible under CERCLA for cleanup of contamination resulting from releases of hazardous substances. Therefore, the Department is both a responsible party and a natural resource trustee for resources it manages that are injured by releases of hazardous substances.

The Department's potential natural resource damage liability is very difficult to predict at this time with certainty for a number of reasons. First, the intent of assessing and collecting natural resource damages is to obtain compensation for residual (i.e., post-cleanup) losses of resources and services. Because cleanup remedies have not been determined at the majority of DOE sites, natural resource damage claims cannot currently be filed at those sites.[4] Second, the Department has no real claim experience to date and has not done any formal natural resource damage assessments at its sites.[5] In addition, there area number of unresolved legal issues surrounding natural resource damage liability, the resolution of which could significantly change

[1] CERCLA defines natural resources as "land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the fishery conservation zone established by the Magnuson Fishery Conservation and Management Act of 1976), any State or local government, any foreign government, any Indian tribe, or if such resources are subject to a trust restriction on alienation, any member of an Indian tribe" (43 CFR Part 11.14).

[2] The term "response action" in this report is used to represent all activities associated with assessing, cleaning up, and monitoring releases of hazardous substances. It includes remedial actions under CERCLA, corrective actions under RCRA, and all similar activities.

[3] Services provided by a natural resource include those of value either to humans or to other ecological resources and include both non-consumptive and passive use services. However, certain categories of economic damages are specifically excluded: forgone taxes, lost wages or other personal income, and losses associated with speculative uses of a resource.

[4] CERCLA 113(g)(l) bars the filing of a claim for natural resource damages at any site on the National Priorities List (NPL), any Federal facility identified under section 120, or any facility at which a remedial action under CERCLA is otherwise scheduled "before selection of the remedial action if the President is diligently proceeding with a remedial investigation and feasibility study under section 104(b) or section 120 (relating to Federal facilities)."

[5] A claim was fried by the State of Ohio in 1986, but it was stayed by the court pending completion of the groundwater cleanup at the Fernald Site.

the Department's potential natural resource damage liability. These include how DOE's ownership of a site affects a State's trusteeship, how Indian treaty rights affect Tribal trustee rights, how the CERCLA exemption for the irreversible and irretrievable commitment of natural resources is applied to DOE sites, and how the regulations in 43 CFR Part 11 limiting damages for interim losses to "committed uses" of resources is interpreted.

Most importantly, the Department is taking proactive steps to minimize and reduce potential claims by working closely with the other Federal, State and Tribal trustees, interested citizens, and other parties. DOE involves these parties early in the cleanup process to ensure that their concerns are addressed and to select, to the extent possible, a cleanup remedy that will, by addressing resource concerns, minimize or eliminate the potential for significant natural resource damage liability. At five facilities, the Department is participating in formal natural resource trustee councils (see Table 8). The Department also addresses these issues through the creation of site-specific advisory boards.

In spite of the inherent uncertainties and DOE's effort to proactively address trustee concerns, both the Administration and the General Accounting Office (GAO) recently have estimated the Department's potential natural resource damage liability based on applying ratios derived from settlement experience in the private sector to DOE's total estimated response action costs. In August 1996, the Administration, under the auspices of the Council on Environmental Quality, worked collaboratively with DOE and other trustee agencies to estimate the Department's potential liability using data compiled by the Department of Justice (DOJ) on natural resource damage settlements at private sector sites.[6] The Administration estimated that the Department's liability may range from $1.2 to $2.1 billion.[7]

GAO was commissioned to estimate independently the Department's potential liability.[8] The August 1996 GAO estimate ranged from $2.3 billion to $20.5 billion, with the most likely range estimated to be $2.8 billion to $13 billion.[9] GAO and the Administration used similar approaches. However, the Administration's estimate of response action costs used only the Base Case from DOE's 1996 Baseline Environmental Management Report (BEMR), while the GAO used the Base Case and two alternative scenarios from DOE's 1995 BEMR.

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[6] *Revised Analysis of the Potential Cost of Natural Resource Damages at Department of Energy Facilities.* Report to the Subcommittee on Oversight and Investigations, Committee on Commerce, U.S. House of Representatives, prepared by the Council on Environmental Quality, August 30, 1996.

[7] The report acknowledges that this estimate is "subject to revision as better data on natural resource injuries at DOE facilities are developed."

[8] *Natural Resource Damages at DOE,* Report number B-272411 to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works, U.S. Senate prepared by the General Accounting Office, August 16, 1996.

[9] The report acknowledges that these estimates are based on several assumptions that, if proven to be incorrect, "could either understate or overstate DOE's potential liability for natural resource damages."

A second GAO report issued in December 1996[10] summarized the Department's efforts to integrate natural resource damage considerations into cleanup decisions and indicated that those efforts, if successful, may reduce DOE's potential liability for natural resource damages. GAO also noted that practical considerations such as budget limitations may limit the extent to which DOE's initiatives can reduce natural resource damage claims.

Section 3154 of the National Defense Authorization Act of Fiscal Year 1997 directs the Department to conduct a study of its potential natural resource damage liability at its sites using DOI's regulations (43 CFR Part 11). This report presents a summary of the Department's efforts to estimate its potential natural resource damage liability and the factors that may influence such an estimate. The methdology used in this report builds upon the methods used for the Administration's and GAO's estimates of potential natural resource damage liabilities DOE facilities. DOE did not use the DOI regulations in preparing this report because the regulations contemplate a lengthy, detailed assessment process that would not be appropriate at most DOE sites until remedy selection is closer to completion if ever. However, DOE has developed and begun to implement a policy to closely integrate natural resource damage and restoration concerns into the response action process. The Department remains convinced that any estimate of the Department's liability for natural resource damage claims at this stage in the cleanup process at DOE's sites is uncertain.

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[10] *Natural Resource Restoration Issues at DOE,* Report number B-275396 to the Committee on Environment and Public Works, U.S. Senate prepared by the General Accounting Office, December 18, 1996.

Background

The Department's environmental program to remediate the environmental contamination left from 50 years of nuclear production is the largest cleanup program in the world. The program encompasses over 140 sites and facilities in more than 30 States and territories. The Department currently has 22 sites on the Environmental Protection Agency's (EPA) National Priorities List (NPL), and response actions are proceeding at these sites as mandated by section 120 of CERCLA. Response actions also are being conducted at other DOE sites either under CERCLA, RCRA, or other authority.

DOE is liable under CERCLA for the costs of response actions to clean up its sites (i.e., to respond to releases or threatened releases of hazardous substances to protect human health and the environment) as well as for natural resource damages. CERCLA allows Federal agencies that have been designated as natural resource trustees, as well as State and Tribal officials, to file claims for monetary compensation for injuries to natural resources that belong to them or are under their control or management when such injuries have resulted from releases of hazardous substances. Such claims are not limited to sites that are listed on the NPL for cleanup under CERCLA.

In this report, natural resource damage liability is defined as monetary damages for injuries to natural resources that are not rectified by the Department's cleanup of its sites. The statute also provides for recovery of interim losses. By statute, all recoveries by Federal and State trustees are required to be used to:

1. Pay for the assessment costs to determine the extent and monetary value of injuries to natural resources, including interim losses; and

2. Restore the natural resources to their baseline condition (i.e., the condition that would have existed in the absence of the release), replace the resources, or acquire equivalent resources.

Under CERCLA, the DOI has issued regulations for conducting natural resource damage assessments.[11] These regulations specify procedures for identifying and measuring injuries to resources and for determining g the amount of monetary damages. These procedures are required by statute to address "both direct and indirect injury, destruction, or loss, and shall take into consideration factors including, but not limited to, replacement value, use value, and the ability of the ecosystem or resource to recover." Injuries are defined by these regulations to be measurable adverse changes in the quality or viability of a natural resource. A trustee claiming damages against the Department must demonstrate that an adverse effect on resources exists and that a release of hazardous substances for which the Department is liable contributed to the injuries.

Various Federal agencies, such as DOI and NOAA, have specific natural resource trustee responsibilities for resources under their purview. DOI serves as the primary trustee for all resources on the lands it manages. Other examples of DOI trust resources include migratory birds, certain fish and non-marine endangered or threatened species and their habitats. NOAA trusteeship includes responsibility for fisheries, marine mammals, endangered or threatened marine species, associated habitat areas, and the resources in the coastal zone of the United States. In addition to the Federal trustees, State and Tribal officials can file suit for damages to natural resources under their trusteeship.

In addition to being the responsible party for releases at its facilities, DOE is also a trustee for its lands and their resources. At facilities where DOE is conducting a response action under EPA or State oversight, the obligation to address natural resource injuries includes ensuring that the response action process adequately considers natural resource issues. This may include actions to restore injured resources or to mitigate or offset resource losses.

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[11] 43 CFR Part 11 —Natural Resource Damage Assessments.

As the lead Federal trustee of natural resources at its sites, DOE has the primary Federal role in addressing natural resource injuries at these sites. Other trustees participate in studying injuries to natural resources at DOE sites and in planning restoration activities. Because a Federal agency generally cannot sue another Federal agency, other Federal trustee agencies cannot file suit against the Department for natural resource damages. Therefore, any future natural resource damage lawsuits would be filed by either State or Tribal officials for injuries to natural resources under their trusteeship.

Damages can be sought for injuries both to resources within the boundaries of a DOE site and to those outside those boundaries, provided that the liability of the Department for the release of a hazardous substance which contributed to the injury can be established Damages also can be sought to compensate for lost use and nonuse values.

DOE's Policy to Integrate Natural Resource Concerns into Cleanup Decisions

The Department's potential liability for natural resource damage claims maybe limited substantially by DOE's policy and practice of integrating natural resource concerns into the planning and decision-making process for the environmental cleanup of its sites. The Department's Assistant Secretary for Environmental Management recently issued an

requiring heads of field organizations and Environmental Restoration program and project managers to consider natural resource risk issues and, when appropriate, resolve them with the other natural resource trustees, such as State and Tribal officials, as apart of the remedy selection process. The objectives of this policy are to promote more complete consideration of the risks associated with cleanup alternatives, lower the total life-cycle costs of the program, and minimize the potential for claims against the Department.

When planning environmental restoration investigations and risk assessment studies, such as baseline risk assessments, project managers are required to ensure that any foreseeable or potential risks to natural resources and the services they provide are included "up front" (e.g., as a part of the scoping exercise) in the development of a conceptual model and data quality objectives for the investigation. An appropriate mechanism for early and ongoing consultation with natural resource trustees is required to be established (e.g., a natural resource trustee council). In addition, trustees should be represented on the Site Specific Advisory Boards.[12] Early consultation provides an opportunity for trustees to review the Department's plans for studies and investigations and allows time to incorporate their concerns into the data quality objectives for the site investigation and risk assessment and later, into the development of the response action.

Throughout the remedy selection process, project managers are required to maintain an ongoing dialogue with the trustees and seek their technical advice on matters related to the investigation of potential natural resource injuries. The technical information provided by the trustees is to be reviewed carefully by project and program managers to learn about any potential risks or injury to existing natural resources which might result from implementation of response action remedies, including whether any additional or life-cycle costs could result. Strong consideration is required to be given to the selection of response actions that minimize injuries to natural resources. The Department intends to document any irreversible and irretrievable commitment of natural resources that may result from implementing the selected response actions in Records of Decision.

The policy further provides that, whenever possible, covenants not to sue for natural resource damages should be obtained from natural resource trustees prior to implementation of the remedy (e.g., as part of the Record of Decision). The Department's stewardship of its facilities in many cases has resulted in environmental results such as enhanced biodiversity, habitat protection for wildlife, and increased natural resource services for stakeholders. Land use and land transfer policies and practices should take into consideration the potential for reducing the Department's natural resource damage liabilities.

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[12] Site Specific Advisory Boards are advisory groups established at individual DOE sites to involve affected community members more directly in policy and technical decisions related to environmental restoration and waste management issues at DOE sites.

Estimating DOE's Potential Liability for Natural Resource Damages

This section presents the methodology used to develop the estimate of the Department's potential natural resource damage liability.

Estimates Are Uncertain

Any effort to assess the Department's potential natural resource damage liability is subject to several sources of uncertainty. First, the absence of any settlements or successful claims against the Department precludes an analysis based on actual claims experience. Second, no natural resource damage assessments have been performed for Department sites, primarily because remedy selection has not been completed at a majority of sites. Until the final remedy for a site is selected, the Department cannot effectively appraise the natural resource injuries that are likely to remain once the response action is completed. In fact, it may be difficult for the Department to complete the preassessment screening process under the DOI regulations (a condition precedent to assessment) until remedy selection has occurred because it is impossible to determine whether the remedy will fully remedy all potential injuries.[13] The Department also believes that scarce resources are better focused on addressing natural resource injuries as part of the response action process rather than conducting costly assessments that would divert funds from such response actions. In addition, a site-specific analysis of the law or facts pertinent to liability at identified facilities may, if

[13] The DOI regulations require a determination that the following criteria are met before proceeding with a natural resource damage assessment (1) a discharge of oil or a release of a hazardous substance has occurred; (2) natural resources for which the Federal or State agency or Indian Tribe may assert trusteeship under CERCLA have been or are likely to have been adversely affected by the discharge or release; (3) the quantity and concentration of the discharged oil or released hazardous substance are sufficient to potentially cause injury to those natural resources; (4) data sufficient to pursue an assessment are readily available or likely to be obtained at reasonable cost; and (5) response actions carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.

publicly disclosed, encourage litigation and/or prejudice the Department's position in later litigation.

A variety of legal and other issues and questions that currently are unresolved may affect DOE's eventual liability. These issues include:

- *How DOE's ownership of a site affects a State's Trusteeship.*

CERCLA provides that a State may claim natural resource damages for injuries to resources that it owns, manages, or controls within its boundaries. However, CERCLA does not address whether natural resources located on Federal installations are under State or Federal trusteeship.

- *How Indian treaty rights affect Tribal trustee rights.*

Indian Tribes are trustees for resources within the boundaries of their reservations. In addition, Tribal treaties can provide rights for off-reservation uses of resources, such as hunting and fishing. However, certain of these treaty rights maybe limited to "open and unclaimed" lands, and certain of DOE's lands may be considered occupied and used for industrial and national defense purposes.

- *How the CERCLA exemption for the irreversible and irretrievable commitment of natural resources is applied.*

Such commitments, for instance, might apply to a permitted waste disposal area and thus might exempt the disposal area from liability for natural resource damages. However, with regard to excavations related to response actions, it should be noted that permits are not required for a removal or remedial action selected under CERCLA and carried out onsite (42 USC 9621 [c]).

- *How DOI's regulation limiting damages for interim losses to "committed uses" of resources is interpreted.*

For example, if groundwater has not previously been used for drinking water, it is unclear how a claim that DOE is liable for the compensable value of the groundwater as a potential drinking water source would be resolved. Another example is that some lost use may have resulted from the nation's commitment of DOE sites for national defense purposes. Therefore, the Department's liability for compensable value may be limited for resources that do not migrate on or off of DOE sites.

Methodology

The Department used a methodology based on that used by the Administration and the GAO to estimate its potential natural resource damage liability. This methodology relies on information about response action costs and settlements for natural resource damages at private cleanup sites. The approach assumes that DOE's experience with natural resource damages will be similar to the settlement experience to date at private sites. While there are numerous Imitations with this approach (see below), the Department's view is that the methodology based on private site experiences is a credible approach in the absence of natural resource damage claim experience at DOE sites. Nevertheless, there is no way to estimate the associated uncertainty.

There are two ways to produce potentially more robust estimates of the Department's natural resource damage liabilities than those provided through the analogy approach such as the one used to prepare the Administration and GAO estimates. First, DOE could attempt to determine the intentions of all the trustees of natural resources potentially injured by releases from DOE lands, including States and Tribes. Gathering this information would be premature since trustees are participating in DOE's ongoing planning for response actions and have not reached the point at which they could state any formal or final position on natural resource damage claims. Second, DOE could conduct detailed ecological surveys at each DOE facility and

attempt to estimate potential natural resource damage Inabilities in accordance with DOI's regulations. The time and cost required for such an effort would be large, the results would still be uncertain, and collection of these data in the form of formal natural resource damage assessments could invite claims that otherwise might not be asserted. In any case, such an estimate would be premature because remedy selection has not been completed at a majority of DOE sites.

The methodology based on private sector experiences includes three basic elements:

- Estimates of the ratio between natural resource damage recoveries and response action costs at private sector sites;
- An estimate (or estimates) of response action costs at DOE sites; and
- A set of assumptions on how to combine these two estimates to develop a range of estimates of potential natural resource damage liabilities at DOE sites.

Estimates of the Ratio between Natural Resource Damage Recoveries and Response Action Costs at Private Sector Sites

The methodology developed by the Administration and GAO uses data on natural resource damage recoveries and response action costs at private sites. These data are maintained in a compendium by DOJ.[14] There are two ways to estimate this ratio from these data:

1. The ratio of natural resource damage recoveries to cleanup costs in the entire universe of cases where potential natural resource damage claims were resolved through either a settlement or covenant not to sue (approximately half of the settled cases resulted in monetary damages for natural resource injuries). This ratio is 5.95 percent.

2. The ratio of natural resource damage recoveries to cleanup costs in the subset of cases in which the natural resource damage claim resulted in a payment of damages or peformance of natural resource restoration work. This ratio is 9.41 percent.

The natural resource damage settlement record at private sites should reflect the full range of compensable damage that courts have recognized in adjudicating natural resource damage claims, including costs of assessment and damages that were determined by considering lost use and passive use values associated with the resource.

Estimates of Response Action Costs at DOE Sites

The 1996 *BEMR Is the Most Recent Estimate of DOE Response Action Costs*

In identifying the response action cost estimates most comparable to the data for cases in the DOJ Compendium, the Department has relied on the data and analyses in the 1996 BEMR. The 1996 BEMR is the most recent estimate of the life-cycle costs and schedules for projects and activities needed to complete the mission of the DOE Office of Environmental Management (EM). The 1996 BEMR provides several alternative life-cycle cost estimates. The Base Case estimate is based on national and site-level assumptions regarding the actions or activities that are most likely to occur in the future. Assumptions for response actions include the nature and extent of existing contamination, as well as anticipated land use, remedy selection, and cleanup criteria. The Base Case assumptions reflect remedy selection standards in the current CERCLA program.

To address some of the uncertainties in the Base Case estimates, the 1996 BEMR also includes several alternative scenarios that examine how total cost may change if major assumptions (e.g., future land use) are varied. Although these analyses indicate that the Base Case estimates could change significantly under alternate sets of assumptions, the Department has concluded that it is not appropriate to use cost estimates from these alternative

[14] *Compendium of Natural Resource Damages Cases under CERCLA: Part I– All Cases with Natural Resource Damage Recoveries; and Part II – Covenants not to Sue for Natural Resource Damages without Additional Recovery,* U.S. Department of Justice, September 1995.

scenarios for the ratio methodology utilized in this report. Using the ratio methodology, an alternative scenario (e.g., "modified removal" or "maximum feasible greenfields") resulting in greater investment in cleanup (e.g., more complete removal of contamination) at the same site would generate higher estimates of natural resource damage liability, while an alternative scenario (e.g., "modified containment" or "iron fence") resulting in less investment in cleanup (e.g., greater reliance on containment of contamination) at the same site would result in lower estimates of potential natural resource damage liability. These results run counter to the experience in the private sector, which has been that greater investment in cleanup at a site tends to reduce the number and size of residual natural resource damage claims. In addition, the Department's experience with stakeholders and regulators suggests that neither of these alternative scenarios is a reasonable program projection.

Not All Costs in the 1996 BEMR Represent Cleanup Activities

The 1996 BEMR reported-a Base Case estimate of the life-cycle cost of the EM program to be $227 billion over the next 75 years. In considering this large cost estimate, it is important to realize that the EM program is more than a "cleanup" program. In addition to cleanup activities (i.e., response actions), its missions include waste management, science and technology development the transition of operational facilities to safe shutdown status, and the safeguarding and security of weapons-grade plutonium and other special nuclear materials. *Therefore, only a portion of the estimated $227 billion life-cycle cost estimate in the 1996 BEMR is for activities comparable private-site cleanups, and thus only this portion, not the entire $227 billion, is an appropriate estimate of DOE's response action costs.* Cleanup activities comparable to those at private NPL sites are conducted by the Environmental Restoration program area. Estimated costs for this program area ($63 billion) are less than 30 percent of the total estimated cost in the BEMR (Table 1).

Not all activities of the Environmental Restoration program area represent "cleanup" (response actions). In addition to response actions, Environmental Restoration activities include the decommissioning of surplus facilities, landlord activities, and program management. These other activities represent $38 billion, or more than half, of the total life-cycle cost estimate for Environmental

Table 1. 1996 BEMR Cost Estimates for Individual EM Program Areas'

EM Program Area	Estimated Life-Cycle Cost
Waste Management	$ 111 billion
Environmental Restoration	$ 63 billion
Nuclear Materials and Facility Stabilization	$ 21 billion
Landlord and Program Management	$ 20 billion
Science and Technology Development	$ 12 billion
Total	$ 227 billion

Restoration program activities (Table 2). Therefore, the starting point for estimating cleanup costs at DOE sites comparable to that in the DOJ Compendium is the 1996 BEMR estimate for response action costs, which is $25 billion. This estimate includes long-term surveillance and monitoring after project completion.

Table 2. 1996 BEMR Estimates for Environmental Restoration Program Activities

Environmental Restoration Program Activity	Estimated Life-Cycle Cost
Response Actions	$ 25 billion
Facility Decommissioning, Landlord, and Program Management	$ 38 billion
Total	$ 63 billion

The total cost for response actions at a privately owned NPL site typically includes the cost of performing the response actions, as well as the cost of managing wastes generated by those actions. DOE therefore adjusted the estimated costs of response actions reported in the 1996 BEMR to obtain an estimate of the total cost for response actions, including associated waste management costs. The estimated costs for managing wastes generated from response action projects are reported in the 1996 BEMR in two different ways. At certain DOE facilities, the Environmental Restoration program is responsible for managing the waste generated from its projects. At these sites, the estimated costs for managing wastes generated from response action projects are included in the cost estimates for those projects. Thus, the cost estimates presented in Table 2 include some, but not all, of the costs associated with managing waste generated by response action projects. At the remainder of DOE's sites, the Waste Management (WM) program is responsible for managing wastes generated by Environmental Restoration program activities. At these sites, the estimated costs for managing these wastes are accounted for in the WM program cost estimates. Consequently, additional analysis of 1996 BEMR data was required to estimate how much of the WM program costs could be attributed to wastes generated from response action projects. The Department estimates that these additional costs are approximately $10 billion. Therefore, the adjusted estimate of response action costs in the 1996 BEMR is $35 billion (Table 3). This cost estimate can be broken out separately for DOE sites on the NPL and DOE sites that are not currently on the NPL. The adjusted total response action cost estimates in the BEMR are $28 billion for NPL sites and $7 billion for non-NPL sites (Table 4).

Table 3. 1996 BEMR Estimate of Total Response Action Costa at DOE Sites

Type of Cost	Estimated Life-Cycle Cost
Cost for Response Action Projects	$ 25 billion
Additional Costs for Managing Waste Generated by Response Action Projects	$ 10 billion
Adjusted Total Costs for Response Actions	$ 35 billion

The 1996 BEMR does not include actual expenditures on response actions by the EM program prior to Fiscal Year 1996. To obtain an estimate of its total life-cycle response action costs, the Department included its actual expenditures on response actions from the beginning of the EM program (1989) until 1995 (these estimated costs were not included in the Administration's estimate). The Department calculates these expenditures to be approximately $6.8 billion, including associated waste management costs. Adding this to the above adjusted BEMR estimates, the Department estimates its overall response action costs will total approximately $41.8 billion. These overall

estimates are $33.4 billion for NPL sites and $8.4 billion for non-NPL sites (Table 5).

Table 4. 1996 BEMR Estimates of Response Action Costs for NPL and Non-NPL Sites

	Estimated Cost for Response Action Projects	Additional Estimated Costs for Managing Waste Generated by Response Action projects	Adjusted Total Estimated Response Action costs
NPL Sites	$20 billion	$8 billion	$28 billion
Non-NPL Sites	$5 billion	$2 billion	$7 billion
Total	$25 billion	$10 billion	$35 billion

Table 5. Overall Estimate of Life-cycle Response Action Costs at DOE Sites

Type of Cost	Amount
Actual Response Action Expenditures 1989-1995	$ 6.8 billion
Adjusted Estimate of Total Response Action Costs in the 1996 BEMR (1996-2070)	$ 35 billion
Overall Estimate of Total Response Action Costs	S 41.8 billion

The Administration's estimate of DOE's response action costs was based solely on response cost estimates in the 1996 BEMR (i.e., actual response action expenditures prior to 1995 were not included). The Administration thus used the figure of $35 billion as this estimate. The GAO's estimates of DOE's response action costs included actual expenditures from 1989 onward but differed from the estimate in this report in two respects. First, the GAO used cost estimates from the 1995 BEMR because the 1996 BEMR data were not yet available at the time GAO was performing its analysis. Estimates in the 1996 BEMR, which represent more current data, are significantly lower than comparable estimates in the 1995 BEMR (generally by about one third). Second, GAO used a range of estimated remedial action costs represented by the different land use scenarios reported in the 1995 BEMR These estimates were $37.9 billion for the "modified containment" scenario, $47.8 billion for the Base Case, and $218.1 billion for the "modified removal" scenario.

Application of Ratios/Percentages

The two ratios developed from the DOJ Compendium provide two different points of, reference. One calculates natural resource damage costs as a percentage of cleanup costs across all sites where natural resource damage claims have been resolved (5.95 percent). The second calculates natural resource damage costs as a percentage of costs at sites where Federal trustees have asserted claims resulting in the payment of natural resource damage or performance of natural resource restoration work (9.41 percent). Application of the latter percentage requires an assumption concerning the percentage of sites where natural resource damage claims are likely to be successful.

The Department believes that the Administration's assumption of 35 percent is a reasoned judgment concerning the percentage of DOE sites that are likely to have natural resource damage liability. This approach does not purport to have predictive value concerning the probability of a claim and ultimate liability at any particular site. To make clear that the 35 percent is not tied to site-specific probability of claims, the 35 percent figure is applied to the total cleanup costs for all DOE sites. Accordingly, this assumption does not disclose or predict whether a claim is likely at any given DOE site.

While there are a number of uncertainties in this approach as already noted and discussed further below, it is preferable to the "worst-case" assumption made by GAO in its set of estimates using the ratio of 9.41 percent that natural resource damage liabilities may be experienced at all DOE sites. That assumption is inconsistent with experience at private sites and with DOE's knowledge of the contamination problems at its facilities. The assumption also made no quantitative adjustment for DOE practices designed to minimize the potential for natural resource damage liability claims after response actions are in place because GAO believed that the effects of these practices could not be predicted. Indeed, experience at private NPL sites suggests that even the 35 percent estimate for DOE sites that will experience natural resource damage claims may in fact be too high. For

example, DOJ and EPA have estimated that payments have been made for natural resource damages at approximately 20 percent of private NPL sites where natural resource damage claims have been resolved or have expired under the statute of limitations under CERCLA.

Applying the two ratios to the overall estimate of total life-cycle response action costs, the Department tabulated the following estimates of DOE's potential natural resource damage liability (Table 6).

Table 6. Summary of Estimated Natural Resource Damage Costs at DOE Sites

	Low-End Estimate of Natural Resource Damage Costs	High-End Estimate of Natural Resource Damage Costs
NPL Sites	$ 1.1 billion	$2.0 billion
Non-NPL Sites	$ 270 million	$ 500 million
Total	$1.4 billion	$2.5 billion

The low-end estimates were developed by calculating 9.41 percent of DOE's response costs for NPL and non-NPL sites, then multiplying by 35 percent to reflect the percentage of facilities likely to have claims. For NPL sites, the estimate is approximately $1.1 billion (0.094 1 x $33.4 billion x 0.35 = $1.093 billion); for non-NPL sites, the estimate is approximately $270 million (0.0941 x $8.4 billion x 0.35= $276.7 million). Thus, the combined low-end estimate (after rounding up) is $ 1.4 billion.

The high-end estimates were developed by calculating 5.95 percent of DOE's estimated response costs for NPL and non-NPL sites. For NPL sites, the estimate is approximately $2.0 billion (0.0595 x $33.4 billion= $1.987 billion); for non-NPL sites, the estimate is approximately $500 million (0.0595 x $8.4 billion= $499.8 million). Thus, the combined high-end estimate (after rounding up) is $2.5 billion.

The Administration's methodology is identical to that used by the GAO in terms of how the former ratio (5.95 percent) was applied to DOE's estimated response action costs. Both the Administration and GAO applied this ratio to estimated response action costs for all of DOE's NPL and non-NPL facilities. The Administration's methodology is different from that used by the GAO in how the latter ratio (9.41 percent) was applied to DOE's estimated response action costs. The GAO applied this ratio to estimated response action costs for all of DOE's sites. This approach essentially assumes that all DOE sites will experience successful natural resource damage claims, an assumption the Department considers to be unrealistic. In contrast the Administration applied this ratio to a percentage of DOE's projected cleanup costs (35 percent), corresponding to a reasoned judgment of the eventual percentage of DOE sites at which claims would be experienced. This percentage, while imprecise, nevertheless is probably on the high side given the experience of the number of natural resource claims filed relative to the number of private sites at which cleanup has been undertaken.

GAO's estimate using only the Base Case scenario from the 1995 BEMR ranges from $2.8 billion to $4.5 billion. Given the lower cost estimates in the 1996 BEMR and the general limitations with this methodology (see below), the natural resource damage estimate presented in this report is reasonably comparable to GAO's estimate.

Limitations of the Methodology

While the above calculations of DOE's natural resource damage potential liability represent a reasonable estimate using existing and easily verified information, there are a number of non-quantifiable factors that generate uncertainty concerning these estimates.

- *Statutory defenses and liability limitations.*

The cost estimates for NPL sites include no discount for defenses or limitations to CERCLA liability. DOE may be more likely to avail itself of certain of these defenses and limitations than responsible parties at privately owned sites. For example, there may be constraints on Indian Tribe claims based on treaty rights. In addition, there is no natural resource damage liability where "the damages to natural resources complained of were specifically identified as an irreversible and irretrievable commitment of resources in an environmental impact statement, or other comparable environment analysis, and the decision to grant a license or permit authorizes such commitment of natural resources, and the facility or project was otherwise within the terms of its permit or license". There also is no liability for natural resource damages where "such damages and the release of a hazardous substance from which such damages resulted have occurred wholly before December 11, 1980." At one DOE facility, 25 percent of the resource impacts at the site were identified and authorized in an environmental impact statement as an irreversible commitment of resources. Other facilities provide similar examples. To the extent a particular limitation or defense operates similarly at privately owned sites, of course, the DOJ Compendium should capture that.

- *Undercounting in the DOJ Compendium data.*

The multipliers do not account for the fact that at a significant number of the sites in the DOJ Compendium, EPA has incurred additional response action costs not recovered from responsible parties due to a settlement compromise, or there are other settlements for response action costs or work that did not expressly include a damages recovery or a covenant not to sue for natural resource damages. If these costs were include< the multipliers would be commensurately lower. In addition, one fairly large settlement included in the Compendium (the Montrose Chemical settlement) consists entirely of natural resource damage recoveries, because response cost recovery claims were unresolved at the time of this partial natural resource damage settlement. If this case were excluded or if response action costs are later resolved and added to the Compendium, the multipliers would be commensurately lower.

- *Equation of NPL and non-NPL sites.*

These calculations include no discount for the fact that most of DOE's non-NPL sites are generally less hazardous than NPL sites and, thus, are likely to generate fewer and relatively smaller natural resource damage claims, In many cases, such as building decontamination or decommissioning, trustee interest in any potential natural resource damage claim may be lacking.

- *Use of constant dollars.*

Any natural resource damage claims will be asserted and addressed at some time in the future. The estimates presented herein do not include any discounting or inflating to account for the time when natural resource damage costs will actually occur. Also, BEMR estimates are in constant, not current or discounted, dollars.

- *BEMR estimates do not include all potential DOE costs.*

DOE has ongoing activities at a number of sites and facilities that are not currently within the EM program. Potential cleanup costs at these sites and facilities are not included in the 1996 BEMR

- *Environmental problems with no feasible remedy.*

Natural resource damages are usually for injuries that are not mitigated by a response action. Therefore, DOE's potential liability maybe greater at sites where DOE cannot fully clean up contaminated areas. The 1996 BEMR lists, but has

no response action cost estimates for, certain areas that have become contaminated with hazardous substances and may not be cleaned up because (1) no feasible remediation approach is available; (2) the risks posed by the contamination do not warrant response actions using existing technologies given the ecological injury that these technologies would cause; or (3) the contaminants will attenuate naturally over time (Table 7). These areas may give rise to potential natural resource damage liabilities.

- ***The DOJ Compendium is incomplete.***

The DOJ Compendium does not include claims filed solely by State or Tribal governments. The DOJ Compendium also does not include several very large natural resource damage claims that have been filed because they currently are pending in the courts. These include the Coeur d'Alene site in Idaho, the Massena site in New York and the Clark Fork River site in Montana.

- ***Comparability of DOE and private sites.***

The record of settlements to date provides a relatively limited sampling of sites at a particular point in time. It is difficult to evaluate whether the nature and degree of natural resource injuries at DOE sites are likely to be comparable to those at the private sites. However, in the absence of specific studies, there is no reason to assume that natural resource injuries at DOE sites will be more costly or more complex than those at private sites. Some factors suggest that the data set in the DOJ Compendium would tend to understate DOE's potential liability. For example, the cases in the Compendium were settled very soon after the enactment of CERCLA, which means that recoveries for interim losses associated with the injured natural resource are likely to be commensurately lower than cases settled later. Other factors, however, suggest that the data set in the Compendium would tend to overstate DOE's

Table 7. Examples of Environmental Media Activities Excluded from the 1996 BEMR

Site	Project	Reason Excluded
Fernald Plant	Great Miami River	No feasible remedy available
Hanford Site	Columbia River, Hanford Reach	No feasible remedy available
	Groundwater	Limited pump-and-treat followed by natural attenuation and monitoring
Idaho National Engineering Laboratory	Snake River Plain Aquifer	Limited pump-and-treat followed by natural attenuation and monitoring
Nevada Test Site	Underground Test Areas	No feasible remedy available
Oak Ridge National Laboratory	Deep Hydrofracture Grout Sheet	No feasible remedy available
Oak Ridge Reservation	Clinch River Poplar Creek Embayment Watts Bar Reservoir White Oak Creek	No feasible remedy available
Rocky Flats Environmental Technology Site	Great Western Reservoir Stanley Lake Walnut Creek Woman Creek	No feasible remedy available
Sandia National Laboratories	Chemical Waste Landfill Groundwatcr	Natural attenuation and monitoring assumed
Savannah River Site	L Lake Par Pond Savannah River Swamp	No feasible remedy without causing collateral injury to natural resources

potential liability. For example, the private data set does not fully reflect the statutory provisions and DOE practices that are likely to lower DOE's potential exposure to natural resource damage claims.

- *Persistence of hazardous substances.*

Past releases of hazardous substances at some DOE facilities may include substances that are persistent and tend to accumulate in food chains. As a result, wildlife that otherwise would not be exposed to the contaminants maybe contaminated through the food that they eat.

- *Sensitive or unique natural resources.*

Some of DOE's sites contain very sensitive natural resources. The Department's potential liability for natural resource damages may be greater at sites where the contaminants could injure sensitive resources. For example, at the Rocky Flats Site in Colorado, the 5,882-acre buffer zone contains a rare tallgrass prairie and habitat for the Preble's meadow jumping mouse, a species that is under consideration for being listed as threatened or endangered Present contaminant levels in the vast majority of the buffer zone do not appear to impact natural resources or require major environmental restoration activities. However, if any response actions are required then DOE plans to design cleanup activities in the buffer zone that protect the mouse and reduce the likelihood of natural resource damage claims.

- *Offsite contamination.*

Contamination at some sites extends beyond DOE's boundaries, which could increase the likelihood of natural resource damage claims. For example, at the Oak Ridge Site, contaminants are transported offsite to the Lower Watts Bar Reservoir by the Clinch River. Offsite contamination may also occur when wildlife such as deer or migratory birds move on and off a DOE site.

- *Economic and cultural factors.*

These factors also may influence the decision of State and Tribal trustees to pursue a natural resource damage claim against DOE. For example, the salmon in the Columbia River near the Hanford Site are highly valued by State and Tribal trustees. In addition to their economic value as a fishery resource, the salmon also have high cultural value, since they are used in Native American ceremonies. As a result Native American Tribes in the area maybe more likely to pursue natural resource damage claims.

Review of DOE Site Experiences

The following sections are based largely upon the December 1996 GAO report. T he findings of this report were confirmed and updated by the DOE sites for this report, and information from several sites not included in GAO's report was added

DOE Experience with Natural Resource Damages

This section summarizes DOE's experience with natural resource damages, including its case study experience and its efforts to incorporate natural resource damage considerations into cleanup activities.

Case Study Experience

DOE has been actively providing guidance and support regarding natural resource damage and natural resource restoration considerations since 1991. However, it has little natural resource damages case study experience at any of its sites. DOE has not conducted natural resource damage assessments following the DOI regulations at any of its sites.

At Hanford, DOE engaged the U.S. Army Corps of Engineers to conduct a preassessment screen for potential injuries to natural resources in the 1100 Area. That preassessment screen was conducted pursuant to DOI regulations. The Record of Decision for the 1100 Area was subject to public comment through the CERCLA process and was approved by DOE, EPA, and the Washington Department of Ecology. The preassessment screen found "no injury" to the natural resources it examined, suggesting to DOE that a formal natural resource damage assessment was not warranted. DOE is aware of independent attempts by non-Federal members of the Hanford Site Trustee Council to make rough estimates of the economic damages to groundwater in the 1100 Area: however, DOE has not participated in these efforts. Other than this attempt, DOE is not aware of efforts by other natural resource trustees to conduct formal natural resource damage assessments or preassessment screens at DOE facilities.

Efforts to Address Natural Resource Damages Considerations

As a Federal trustee for resources under its control, DOE has begun efforts to address natural resource restoration within its environmental restoration programs. These efforts have been primarily for the purposes of being a good steward for resources under its control, as well as for reducing the potential liability for natural resource damages under CERCLA. Efforts have been undertaken at both the headquarters and site levels.

Headquarters Activities

As noted earlier, the Assistant Secretary for Environmental Management recently issued an interim policy requiring heads of field organizations and Environmental Restoration program and project managers to consider natural resource risk issues and, when appropriate, resolve them with the other natural resource trustees, such as State and Tribal officials, as apart of the remedy selection process. The objectives of this policy are to promote more complete consideration of the risks associated with cleanup alternatives, lower the total life-cycle costs of the program, and minimize the potential for claims against the Department.

Prior to the issuance of the policy statement, DOE's Office of Environment Safety, and Health (EH) issued guidance[15] on how sites can work with State, Tribal, and other Federal trustees to (1) assess resource injuries during the remedial investigation phase of the cleanup process; (2) avoid selecting remedies that harm natural resources; and (3) select remedies with the least total costs, considering the combined costs of cleanup and natural resource restoration.

The EH guidance has three major objectives. The first is to improve cleanup decisions by promoting

[15] *Natural Resource Trusteeship and Ecological Evaluation for Environmental Restoration at Department of Energy Facilities* (DOE/EH-0192, 1991).

decisions that are based on a more complete analysis of short- and long-term environmental risks and liabilities. To do this, the guidance recommends that project managers at DOE's sites work with other natural resource trustees (including State, Tribal, and other Federal officials) to expand the scope of the ecological risk assessments that are conducted as part of the CERCLA cleanup process. Specifically, the guidance recommends tailoring ecological risk assessments so that they include data that enable the trustees to evaluate potential injuries to natural resources. This would *enable* DOE to take natural resource impacts into consideration before cleanup remedies are selected.

DOE has undertaken a number of activities aimed at assisting site personnel with the integration of natural resource damage considerations into cleanup activities. These have included the following:

- A workshop entitled "Workshop on Natural Resource Trusteeship and Ecological Evaluation Requirements," which was held at or near DOE sites throughout the country;
- Publication of a paper describing how to integrate natural resource concerns into response actions;[16]
- Creation of a Natural Resource Trustee Steering Committee across the DOE complex; and
- Publication of two Information Briefs on natural resource damage assessments.[17]

Site Activities

Reflecting DOE's policy and guidance, several of DOE's sites have begun to integrate consideration of natural resource restoration into overall cleanup plans and activities. These efforts may help to reduce the Department's potential liability for natural resource damages. However, practical considerations such as-budget limitations may limit

[16] *Integrating Natural Resource Damage Assessment and Environmental Restoration at Federal Facilities,* by Sharples, F. E., R.W. Dunford, J.J. Bascietto, and G.W. Suter, II. Federal Facilities Environmental Journal, Volume 4, Number 3, pp. 295-317.

[17] *Natural Resource Damage Assessment: Preassessment Screening and Integration with CERCLA Ecological Evaluations* (EH-231-008/0991); and *Natural Resource Damages Under CERCLA* (EH-231-017/0693).

the extent to which DOE's initiatives can reduce natural resource damage claims.

Five sites have established formal natural resource trustee councils whose members include representatives horn State environmental departments, Native American Tribes in the area, DOI, and DOE.[18] At two of these five sites, DOE has signed memoranda of understanding with the other trustees for natural resources at their sites that lay out the trustees' duties and responsibilities, while the other three are working on developing similar memoranda of understanding. DOE is working with the other trustees on the councils to obtain their advice and input into cleanup plans before they are implemented. Table 8 presents a profile of natural resource trustee councils at DOE sites. In addition, some of DOE's sites have developed specific procedures (such as seasonal restrictions on activities that could disturb the breeding seasons of wildlife) to reduce or avoid adverse effects on natural resources during cleanup activities. While the sites' specific actions and initiatives vary, each of these sites has undertaken some efforts to consider the impacts of its cleanup activities on natural resources.

At the Savannah River Site, DOE officials have been working closely with the other natural resource trustees for over five years to obtain their input into cleanup and natural resource restoration decisions. For example, natural resource trustees were involved in DOE's decision-making process when some contaminated sediments in one of the site's holding ponds became exposed after a dam was undermined. DOE repaired the dam, refilled the pond, and continues to monitor contaminants levels. DOE officials at the Savannah River Site have discussed forming a natural resource trustee council with the other trustees and have developed a draft memorandum of agreement for organizing their activities.

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[18]NOAA is a Federal trustee when coastal resources are involved. EPA is not a trustee for natural resources; however, it has participated in some trustee council activities—for example, at the Rocky Flats and Hanford Sites.

Table 8. Profile of Natural Resource Trustee Councils at DOE Sites

Site	Existence of Formal Trustee Council	Memorandum of Understanding Among Trustees	Council Members
Fernald	No[1]	None	Not applicable
Hanford	Yes	Signed November 1996	DOE, DOI, States of Washington and Oregon, Yakima Indian Nation, Confederated Tribes of Umatilla Indian Reservation, Nez Perce Tribe
Idaho National Engineering Laboratory	Yes	Draft memorandum of understanding	DOE, DOI, State of Idaho, Shoshone-Bannock Tribes
Los Alamos National Laboratory	No	None	DOE, DOI, Department of Agriculture, State of New Mexico, San Ildefonso, Cochiti, Jemez, and Santa Clara Pueblos
Oak Ridge	Yes	Signed February 1995	DOE, DOI, State of Tennessee, Tennessee Valley Authority
Pantex	Yes	Draft memorandum of undemanding	DOE, DOI, State of Texas
Rocky Flats	Yes	Signed October 1994	DOE, DOI, State of Colorado
Sandia National Laboratories	No	None	DOE, State of New Mexico
Savannah River	No[1]	Draft memorandum of agreement	Not applicable

1) Fernald and Savannah River are working closely with trustees. however not through a formal council mechanism

At the Idaho National Engineering Laboratory, DOE has made progress in developing plans with the trustees for integrating considerations about natural resource restoration into cleanup activities. The trustee council, despite its recent establishment, has begun the task of identifyng the site's most important natural resource restoration needs. The trustees agreed that most of the emphasis should be placed on three cleanup areas where the most ecological risk exists. In September 1996, the council met to discuss the status of cleanup activities at these areas and to make initial plans for obtaining the trustees' input to the planned cleanup activities.

In addition, the trustees agreed to work together to identify the data needs for the ecological risk assessment for the cleanup area that involves most natural resources at the site. According to a DOE official at the site, obtaining the trustees' input into the ecological risk assessment will help enable DOE to integrate considerations about natural resource restoration into the cleanup plans for this area.

At the Fernald Site, although no formal trustee council exists, DOE and the other trustees have tentatively agreed to integrate natural resource restoration needs with future cleanup activities, incorporating the concerns raised in the State of Ohio's natural resource damages claim. Specifically, DOE plans to use an assessment of natural resource impacts at the site in order to develop agreements with the trustees about what types of natural resource restoration work will compensate for the impacts to natural resources that have occurred.

At the Hanford and Rocky Flats sites, DOE and the other trustees for natural resources who participate in the sites' natural resource trustee councils have long-standing working relationships. The trustees, however, have experienced some challenges in working together to integrate considerations about natural resource restoration into cleanup activities. For example, at the Hanford site, the large size of the council and the many diverse views of its

members have made it difficult for the council to operate as a unit. Instead, participants have individually raised concerns to DOE about natural resources. DOE is working on ways to improve the ability of the natural resource trustees at the Hanford Site to operate as a unit. At the Rocky Flats Site, one of the most challenging issues facing the council is the practical considerations involved in balancing the need to protect human health with the need to protect natural resources.

At the Pantex Site, the trustees have met with DOE and a draft memorandum of understanding has been developed. The goal of the Pantex Site is to involve the trustees in the selection process of remedy design to best serve protection and restoration of natural resources and preclude natural resource damage assessments.

At the Los Alamos and Sandia National Laboratories, trustee involvement is in the development stage. At Los Alamos, a spring meeting is being planned to discuss areas of mutual interest and to provide input on the Natural Resource Management Plan at the Laboratory. At Sandia, the primary focus of the interaction with trustees will be to integrate the corrective action process under RCRA with natural resource damage issues.

In addition to the activities described above, DOE site managers are working on several other initiatives to integrate considerations about natural resource restoration into their cleanup activities. These initiatives range from a pilot project at the Savannah River Site to demonstrate how resource restoration might be integrated into cleanup activities at a particular unit within the site to efforts at the Hanford and Rocky Flats sites to reduce or avoid adverse effects on natural resources during cleanup activities.

Major Challenges to Integrating Natural Resource Damages Considerations into Cleanup Activities

The most important factor that could hinder DOE's ability to address resource restoration concerns during cleanup activities is limited budgets. Since traditional ecological risk assessments do not require DOE to demonstrate specific adverse impacts to natural resources, it maybe difficult for DOE to obtain funding for the additional data gathering and analysis that would be needed. However, integrating considerations about natural resource restoration into cleanup activities could reduce total costs because DOE would be better equipped to consider the potential costs of natural resource damages associated with cleanup alternatives.

Depending on the complexity of the considerations and the number and diversity of interested trustees, trustee councils may find it difficult to work as a unit to identify and prioritize natural resource restoration needs. As a result, it maybe difficult for some councils to provide focused, timely input to the ecological risk assessments that DOE prepares. For example, although the trustee council at the Hanford Site has been meeting for over three years, the large number of trustees and the many diverse views that they hold have made it difficult for the council to identify and prioritize natural resource restoration needs.

Another challenge facing DOE involves difficulties in estimating injuries to natural resources that will remain after particular cleanup actions are implemented. Such injuries and the potential damages associated with them cannot be precisely known until response actions are completed. As a result, it maybe difficult for DOE to determine which cleanup alternatives result in the lowest total costs.

DOE Site Efforts to Integrate Natural Resource Restoration Considerations into Cleanup Activities

As discussed below, four DOE sites have made major efforts to integrate natural resource restoration considerations into cleanup activities.

Rocky Flats Site

The Rocky Flats Site in Colorado has undertaken several initiatives to reduce or avoid the potential adverse impacts of cleanup activities on natural resources. These actions are called compensatory mitigation activities and include such activities as avoiding an impact by not taking a certain action; minimizing an impact by limiting the magnitude of an action; rectifying an impact by repairing, rehabilitating, or restoring the affected resource; and

compensating for the impact by replacing or providing substitute resources.

DOE's compensatory mitigation activities at the Rocky Flats Site are focused on the buffer zone, which contains some rare and sensitive natural resources. In February 1996, the Colorado Natural Heritage Program reported that the buffer zone may contain the largest example of a special kind of tallgrass prairie remaining in Colorado and perhaps in North America.[19] The Program believes that this type of prairie exists in less than 20 places globally. The buffer zone is also home to the Preble's meadow jumping mouse, an animal under consideration for listing as a threatened or endangered species. To protect the Preble's meadow jumping mouse, DOE has designated areas of the buffer zone as "essential habitat." In May 1995, DOE established an interim policy that permits only necessary work in the essential habitat of the mouse. Necessary work is defined as that which is (1) designed to study the species; (2) required to protector enhance natural resource values; or (3) expressly required by regulatory direction or agreement. Should cleanup activities be required in any area of the site where the mouse or its habitat exists, DOE plans to try to avoid any adverse impact to the species.

Another example of DOE's efforts to integrate natural resource considerations into cleanup activities at the Rocky Flats Site is a wetlands mitigation banking agreement signed in early 1996 by DOE and the other trustees."[20] Among the natural resources at the Rocky Flats Site are about 1,100 wetlands covering approximately 191 acres. These wetlands are established in man-made drainages and around naturally occurring seeps and springs. They can also occur as the result of spring runoff from melting snows and overflow from the site's drainage creeks. According to the Colorado Natural Heritage Program, the wetlands may retain nutrients and provide forage, cover, and nesting habitat for wildlife, including the Preble's meadow jumping mouse. The wetlands mitigation banking agreement provides a procedure whereby DOE can create or enhance existing wetlands in the area in order to compensate for cleanup activities that disturb or destroy wetlands.

Hanford Site

The Hanford Site in Washington State has initiated several efforts designed to reduce or avoid the potential adverse impacts of cleanup activities on natural resources. When cleanup activities at the site destroy vegetative cover, DOE revegetates the affected areas with native plant species. Revegetation with native species is preferred because it (1) avoids additional natural resource damages; (2) prevents erosion more effectively; and (3) enhances stewardship of resources under DOE trusteeship.

In March 1996, a demonstration revegetation project was approved for a 3-acre area where the vegetation had been severely disturbed. The ecological goals of the project are to stabilize the area against wind erosion and encourage the succession of vegetation to allow the eventual restoration of a native shrub-steppe community. The overall goal of the project is to demonstrate the methods and practicality (e.g., cost and effectiveness) of revegetation methods that can be extrapolated to other locations at the Hanford Site.

In another case, the feasibility study for an area at the Hanford Site that contains many liquid waste disposal facilities includes an appendix that examines how cleanup alternatives affect natural resources. The feasibility study found that cleanup activities could adversely affect sensitive wetlands habitat It pointed out ways to reduce the ecological risks, including the use of seasonal restrictions on construction and other activities that could disturb the breeding seasons of waterfowl and other wildlife. The Hanford Site is also developing guidance on managing biological resources at the

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[19] This grassland, known as xeric tallgrass prairie, has been highly affected by urban and rural development. In addition, non-native species such as cheat grass and knapweed have invaded and degraded the viability of many examples of this type of prairie throughout the West.

[20] Wetlands mitigation banking is wetlands restoration, creation, enhancement, and, in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetlands losses in advance of development actions (or cleanup activities, in DOE's case).

site that will lay out procedures for minimizing adverse impacts on key biological resources during site cleanup activities.

Savannah River Site

In fiscal year 1994, the Savannah River Site in South Carolina undertook a project to demonstrate how natural resource restoration considerations might be integrated into environmental cleanup activities.[21] The project highlighted several data needs for successfully integrating natural resource considerations into the cleanup plans for an old seepage basin. These data requirements included a description of the pathways linking hazardous substance releases to natural resource injuries; the type, extent, and timing, of natural resource injuries and the lost usage of the natural resources; and the value of the services provided by the natural resources. DOE officials reported that the Savannah River pilot project has been used to help guide other sites seeking to integrate natural resource considerations into cleanup activities. For example, after the study was completed, DOE presented its results to its Natural Resource Trustee Steering Committee, a group of headquarters and site officials who share information and advice on natural resource restoration activities.

Fernald Site

The Fernald Site near Cincinnati, Ohio, is the only DOE site where a natural resource damage claim has been filed. The claim was filed in 1986 by the State of Ohio in the United States District Court for the Southern District of Ohio. The claim alleged that DOE's releases of hazardous substances had injured and continued to injure natural resources including land, air, water, and groundwater. The claim was stayed under a 1988 consent decree between Ohio and DOE, pending completion of the remedial investigation and feasibility study for groundwater remediation.

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[21] See Barnthouse, L.W., J.J. Bascietto, S.A. Deppen, R.W. Dunford, D.E. Gray, and F.E. Sharples. 1995. *Natural Resource Damage Assessment Implementation Project: Savannah River Site.* Report prepared by the U.S. Department of Energy, Office of Environmental Policy and Assistance, Washington D.C.

For the last several years, DOE has been working with natural resource trustee representatives from the State of Ohio and DOI to find a way to address the natural resource concerns raised in the lawsuit. In 1993, DOE initiated discussions with the trustees to determine the feasibility of integrating the trustees' concerns with future cleanup activities. DOE and the trustees have tentatively agreed to integrate natural resource restoration needs with cleanup activities, incorporating the concerns raised in the lawsuit. This would enable the trustees to use a streamlined approach that avoids a formal natural resource damage assessment.

A streamlined method for assessing injury and natural resource restoration needs at the site would avoid the determination of dollar figures associated with a natural resource damage assessment. Instead, DOE plans to use an assessment of the impacts on natural resources at the site to develop agreements with the trustees about what types of natural resource restoration work will compensate for the impact on natural resources that have occurred. The objective will be to find away to equate the impacts on natural resources with natural resource restoration plans without going through the difficult, controversial, and time-consuming process of assigning dollar values to every impact on natural resources. As of October 1996, DOE officials at the Fernald Site were working on a document intended to help the Department and the other trustees to accomplish this objective, which may include settling the outstanding claim.

Diverse Natural Resources at DOE Sites

DOE properties throughout the United States are home to a tremendous diversity of natural resources, including terrestrial and aquatic vegetation and wildlife.[22] For example, almost 240 species of terrestrial vertebrates have been observed on the Hanford Site alone. Natural resources on DOE sites are distributed across more than 140 sites and more than 30 States and territories of the U. S., some of which encompass large tracts of land including buffer zones. The rich and unique natural resources found on DOE's sites. may provide services in excess of those injured by DOE's actions or releases.

Many sites are protected from the impacts of agriculture, grazing, burning, and other physical disturbances, and hence contain areas of relatively undisturbed native plant communities. These sensitive areas include wetlands, native grasslands, shrub-steppe, tree groves, and riparian areas. They generally represent habitat types that are either rare or declining on a regional basis or are easily disturbed. Wetlands are common on DOE sites, providing critical habitat for migratory birds and an environment for many Federally listed sensitive plant species. Eight major sites support fragile native grasslands, some of which once covered vast portions of the region or State, but which now are rapidly disappearing or being invaded by aggressive non-native species. Increasingly rare shrub-steppe vegetation occurs on the Hanford Site and the Idaho National Engineering Laboratory. Across the complex, tree groves provide critical habitat for a variety of wildlife, including nest sites for raptors and songbirds, and hiding places and thermal cover for other species. Riparian areas also provide vital habitat for both aquatic and terrestrial biota across the complex. These areas are easily disturbed by contamination or construction.

Over 150 Federal and State listed endangered threatened, or candidate plant and animal species occur on DOE sites. While some of these occur on

[22] McAllister, C., H. Beckert, C. Abrams, G. Bilyard, K. Cadwell, S. Friant, C. Glantz, R. Mazaika, and K. Miller. 1996. *Survey of Ecological Resources at Selected U.S. Department of Energy Sites*. Report No. DOE/EH-0534. Prepared for the U.S. Department of Energy Under Contract DE-AC06-76RLO 1830. Pacific Northwest National Laboratory, Richland, Washington 99352.

one site only, others occur at multiple sites, including the ferruginous hawk, the peregrine falcon, and the loggerhead shrike. Many others, such as the whooping crane and long-billed curlew, are migratory and appear at sites along their migratory routes. Many of these bird species depend on the sensitive plant communities found on DOE sites. The bald eagle occurs on eight sites and is known to roost on DOE property. Other Federally listed endangered species include the Large-flower fiddleneck, Wright's fishhook cactus, the Alabama lamp pearly mussel, shortnose sturgeon, the American crocodile, the Eastern cougar, and the Gray bat. Several sites have one or more big-game or wild species, such as the elk, white-tailed deer, and feral pigs.

Most of DOE's production and research sites have had limited public access for decades, and only certain portions of the sites have been subjected to human activity. For example, as a result of this limited public access and limited physical disturbances, many physical impacts have been avoided (e.g., the absence of irrigated agriculture, grazing, water pollution, and human intrusion and development). Major environmental results that have accrued as a result of DOE's presence and management practices include (1) the establishment of a refuge for native species; (2) the preservation of habitat which serves as a stopping place for migratory birds; (3) the presentation of spawning habitat for migratory fish; (4) the presentation of ecosystems that provide food, cover, reproductive habitat and migration corridors for species of concern; and (5) the preservation of aquatic and riparian zones that provide clean water, soil and stabilization.

At the Hanford Site, a comparison of adjacent land holdings with those of DOE suggest that had DOE not acquired the land much of it would have undergone development such as farming, urban development, and industrial construction. This course of ownership and development would have significantly altered the landscape, and would have resulted in large-scale losses of habitats, species diversity, and genetic diversity within native species. Agricultural, industrial, and residential uses would have prevailed over current conservation uses. Such major environmental changes would have become very difficult to reverse over time.

Conclusion

Any estimate of the Department's natural resource damage liability necessarily is uncertain. The Administration and GAO have both made estimates of potential natural resource damage liability at DOE sites using the only readily available data, which are records of settlements at private sector sites. To date, there is no data base consisting of actual DOE site-specific claims experience nor of potential injuries to natural resources after response actions are completed. At this time, the Department cannot predict with certainty how many sites, or which sites, will experience claims and what its ultimate liability will be. However, for the reasons discussed in this report, the Department believes that the estimate of $1.4 billion to $2.5 billion is a more reasonable estimate of its potential natural resource damage liability than that of the GAO, given the very limited available information and recognizing a large range of uncertainty. DOE also intends to reflect its potential natural resource damage liability in a footnote in its consolidated financial statements.

DOE has developed and begun to implement a policy to closely integrate natural resource damage and restoration concerns into the response action process. A key component of this is the development of final processes and organizations through which the advice of other natural resource trustees can be provided as input into DOE's cleanup plans before they are implemented. Through activities such as these, DOE plans to strengthen its efforts to reduce natural resource damages to the maximum extent feasible.

Appendix

Interim Policy on Integration of Natural Resource Concerns into Environmental Restoration Projects

memorandum

DATE: February 5, 1997

REPLY TO ATTN OF: EM-47 (C. Magnuson, 3-7651)

SUBJECT: Interim Policy on Integration of Natural Resource Concerns into Environmental Restoration Projects

TO: Distribution

The purpose of this memorandum is to establish an Environmental Management policy to address the Department of Energy's responsibilities as both a natural resource trustee and lead response agency for environmental restoration activities at its sites. This policy requires heads of field organizations and Environmental Restoration program and project managers to consider natural resource risk issues and, when appropriate, resolve them with the other natural resource trustees, such as States and Tribes, as a part of the remedy selection process. This policy applies to all types of cleanup conducted under the Comprehensive Environmental Response, Compensation and Liability Act and the Resource Conservation and Recovery Act. The objectives of this policy are to promote more complete consideration of the risks associated with cleanup alternatives, lower the total life-cycle costs of the program, and minimize the potential for claims against the Department.

When planning environmental restoration investigations and risk assessment studies, such as baseline risk assessments, project managers should ensure that any foreseeable or potential risks to natural resources and the services they provide are included "up front" (e.g., as a Part of the scoping exercise) in the development of a conceptual modeland data quality objectives for the investigation. An appropriate mechanism for early and ongoing consultation with natural resource trustees should be established (e.g., a natural resource trustee council). In addition, trustees should be represented on the Site Specific Advisory Boards. Early consultation provides an opportunity for trustees to review the Department's plans for studies and investigations and allows time to incorporate their concerns into the data quality objectives program for the site investigation and risk assessment and later, into the development of the response action.

Throughout the remedy selection process, project managers should maintain an ongoing dialogue with the trustees and should seek their technical advice on matters related to the investigation of potential natural resource injury. The technical information provided by the trustees should be reviewed carefully by project and program managers to learn about any potential risks or injury to existing natural resources which might result from implementation of response action remedies, including whether any additional or life-cycle costs could result. Strong consideration should be given to the selection of response actions that minimize injuries to natural resources. Records of Decision should document any irreversible and irretrievable commitment of natural resources that may result from implementing the selected response actions.

Whenever possible, covenants not to sue for natural resource damages should be obtained from natural resource trustees prior to implementation of the remedy (e.g., as part of the Record of Decision). The Department's stewardship of its facilities in many cases has resulted in environmental benefits such as enhanced biodiversity, habitat protection for wildlife, and increased natural resource services for stakeholders. Land use and land transfer policies and practices should take into consideration the potential for reducing the Department's natural resource damage liabilities.

The Department's Natural Resource Trustee Steering Committee sponsored by the Office of Environmental Policy and Assistance should be used as a technical resource for sites implementing this policy. This policy is not intended to require reopening of previous response action decisions.

Questions or comments regarding this policy should be directed to Claude Magnuson of the Office of Environmental Restoration at (301) 903-7651, Martha Crosland of the Office of Site Operations at (202) 586-5793, or John Bascietto of the Office of Environmental Policy and Assistance at (202) 586-7917, no later than February 28, 1997.

Alvin L. Alm
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